



# Ethtool Support for Microsoft Hyper-V

A LINUX INTEGRATION SERVICES PROJECT

# Hyper-V

- ▶ Bare-Metal Virtualization
  - ▶ A software-based abstraction of computer hardware that enables a host machine to run multiple guest machines.
- ▶ Virtual Machine
  - ▶ A guest machine with its own OS running on the host's hypervisor.
- ▶ Hyper-V
  - ▶ Host-based software providing support for virtualization of guest machines.
- ▶ Great support for Windows Virtual Machines
- ▶ Good support for Linux Virtual Machines

# Linux

- ▶ Ubiquitous Open Source Operating System
- ▶ CentOS
  - ▶ We developed on CentOS 7 as it is available on Azure.
- ▶ Kernel
  - ▶ The core part of the OS that interfaces the hardware with the user's software.
- ▶ Driver
  - ▶ Kernel software which interfaces with a particular piece of hardware.
- ▶ Linux Integration Services
  - ▶ Microsoft's drivers enabling support of Linux guests on Hyper-V.

# Virtual Receive Side Scaling

- ▶ Microsoft technology introduced in Windows Server 2012 R2
- ▶ Enables parallel processing for network traffic
- ▶ Consider a server with a 10 Gbps network card, a dozen virtualized servers running on Hyper-V, and an eight-core processor
  - ▶ Virtual receive side scaling allows each server to use every allocated core equally for processing its traffic

# Ethtool

- ▶ Human interface with the machine's Network Interface Card
- ▶ Shows current configuration of network card
- ▶ Can change network card's settings

# Problem Statement

- ▶ A Linux virtual machine running on Hyper-V has a set of drivers (LIS) for its virtual hardware.
- ▶ We are concerned with the Linux kernel driver “hv\_netvsc,” the virtual driver for the machine’s network card.
- ▶ Supporting ethtool means patching the driver with callback functions for each ethtool command, in particular:
  - ▶ `ethtool --show-channels eth0`
  - ▶ `ethtool --set-channels eth0 combined 1`

# Our Contribution

- ▶ A system administrator can now remove a single-core/processor bottleneck and configure usage of parallel processing for network traffic through ethtool
- ▶ We created two patches to the Linux kernel:
  - ▶ The first implements retrieving the number of vRSS queues on the guest, and the maximum allowed on the host.
  - ▶ The second implements setting the number of vRSS queues on the guest between a single queue and a queue for each virtual processor.

# Example

```
$ ethtool --show-channels eth0
```

```
Channel parameters for eth0:
```

```
Pre-set maximums:
```

```
RX: 0 TX: 0
```

```
Other: 0 Combined: 64
```

```
Current hardware settings:
```

```
RX: 0 TX: 0
```

```
Other: 0 Combined: 4
```

```
$ ethtool --set-channels eth0 combined 1
```

```
$ ethtool --set-channels eth0 combined 1
```

```
combined unmodified, ignoring no channel  
parameters changed, aborting
```

```
current values: tx 0 rx 0 other 0 combined 1
```

```
$ ethtool --set-channels eth0 combined 0
```

```
Cannot set device channel parameters: Invalid  
argument
```



Questions?